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PHENOLOGY SATELLITE EXPERIMENT
ERTS-A PROPOSAL No. MMC 159

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GSFC No. UN 057

Progress Report for Period 4/08/73 - 6/08/73

Accomplishments during this reporting period include:

A.) The location of each of the 30 subsites on computer printout of satellite data processed by Texas A & M University was completed. This has required a great deal of time since some of the subsites, particularly those for alfalfa and winter wheat, are relatively small compared to range-land sites.

Considerable information on visual observations of the green wave on irrigated and non-irrigated acreages throughout the West have been obtained this spring. Hundreds of phenological observers of lilac and honeysuckle cooperated in this task by recording observation dates on post cards. These data are now being coded and placed on punched cards. Observers also indicated the major crops and native species which were growing on irrigated and non-irrigated areas.

Data collected last fall on the browning of lilac and honeysuckle leaves from hundreds of observers have been placed on punched cards. Computer processing of the data to determine areal patterns will be undertaken next.

Observations are beginning to come in from the hundreds of phenological observers who are visually observing the brown wave on irrigated and non-irrigated acreages for the first time throughout the West.

Computer analysis of ERTS data for the Green Wave has been slowed due to time required to examine the appropriate imagery, order and receive the required tapes.

B.) Processing of tapes for the Rocky Mountain Corridor and Columbia Valley Corridor are continuing.

C.) A procedure was developed by the Laboratory for Applications of Remote Sensing (Purdue University) to account for changes in solar elevation and atmospheric transmissivity. The purpose of this investigation was to derive appropriate correction factors and to determine their usefulness in analyzing the data.

After reformatting each set of data tapes and locating the same test sites on each one, a statistical analysis was obtained for each of the four ERTS MSS bands for each individual date. The mean values were then plotted on four separate graphs, one for each band, with the mean spectral response vs. the date being analyzed.

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EXPERIMENT Progress Report, 8 Apr. - 8
Jun. 1973 (Cornell Univ.) 3 p HC \$3.00

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C.) Continued

Then, utilizing these satellite sensed values as well as the solar elevation at the time the data was obtained and total solar radiation measured at the earth's surface, we have obtained a ratio of the response between two of the given dates which is applied to each channel separately. Thus, comparisons were made between each possible combination of pairs to determine the amount of increase or decrease in response from one date to another.

After noting the comparisons for all dates, four major points were discernible.

1. The longer the time between observations, the more important the correction factor becomes.
2. In the visible bands 4 and 5, where the raw statistics showed no systematic change, the corrected values indicate a definite increase in response as senescence occurs.
3. While there is a significant shift in the infrared bands 6 and 7, after applying corrections, they are not sufficient to reverse the direction of the change in response. The near infrared still shows a decrease in reflectance as the Brown Wave progresses.
4. Similar results are obtained whether direct or total solar radiation is used in the equations.

D.) Ground observations were taken at all sites to document the Green Wave and the drought induced Brown Wave at the western sites.

E.) Preliminary work on the development of new phenoclimatic models has been started.

Publications and Papers:

Caprio, J. M., "A World Estimate of the Green Wave and Its Possible Detection by ERTS-1 Satellite", Weekly Weather and Crop Bull., (NOAA) 60(15):16-17, April 9, 1973.

_____, "Timing the Green Wave", NOW, Montana State Univ. College of Agriculture, Bozeman, Montana, 9(3):6-7, Spring 1973.

Ashley, M. D., and B. E. Dethier, "Phenological Determinations from Satellite and Terrestrial Sensor Systems", Proceedings of the First Pan American Symposium on Remote Sensing, Panama, April 27-May 2, 1973.

No operational changes are recommended.

No changes were made in standing order forms.

A listing by date of any Data Request Forms (retrospective data):

April 10, 1973

May 16, 1973

" 11
" 12
" 16
" 17
" 18
" 19
" 20
" 23
" 24